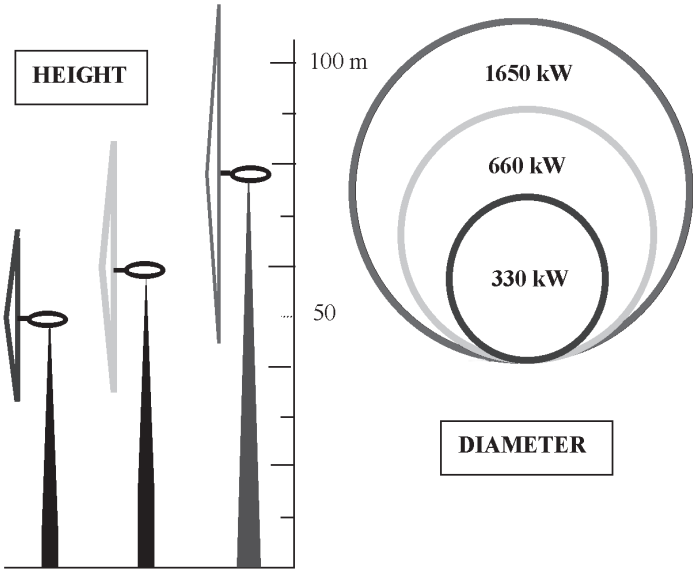
Roping the Texas Breezes

RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

HIGHLIGHTS

- **Wind power has been used in Texas for more than a century**
- **Texas has a large wind resource, but we are only using a small part of it for wind energy**
- **Texas wind farms are now making electricity for Texans**



SIZES OF WIND TURBINES INSTALLED ON TEXAS WIND FARMS *The 1650 kW turbine is taller than the Statue of Liberty.*

SUMMARY

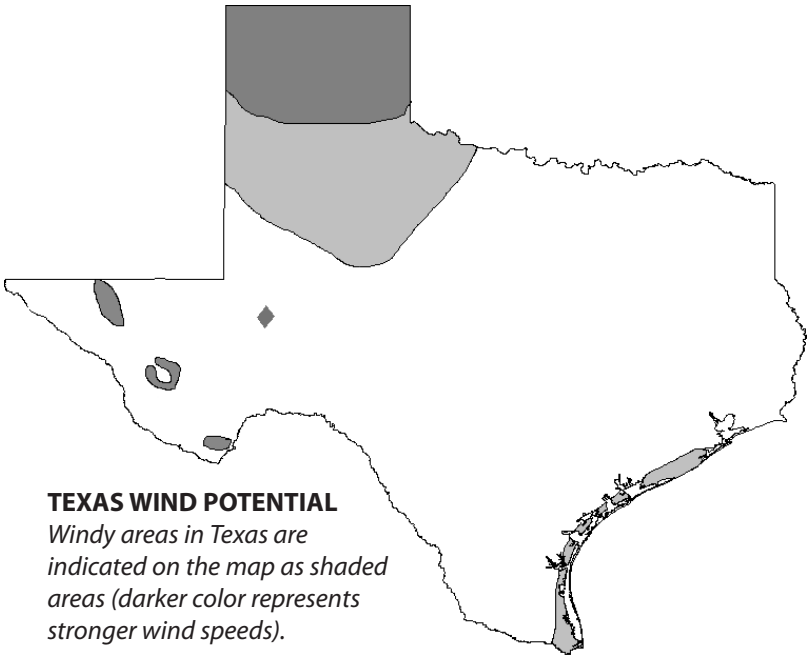
Did you know that more than 80,000 windmills are still in use in Texas? For decades, these simple, rugged machines have pumped water for homes and livestock. Recently, wind power for electricity has become cheaper and more common. Large commercial wind turbines can create electrical power between 500 kilowatts to more than a megawatt, which could provide power for more than 200,000 homes in Texas. Wind turbines can create electricity for less money than electricity created from new coal-fired power plants. And if we consider costs like air pollution and greenhouse gases, wind power may be the least expensive source of electrical power available today.

ROPING THE WIND *Even using a small portion of available wind power can help meet Texas' electricity needs.*

WIND TURBINES

Wind turbines convert the kinetic energy that is present in wind into a more useful energy such as electricity. Windmills were

common on farms and ranches several decades ago before electricity became more available in rural areas. These small units were rated at 100 Watts to 1 kilowatt (kW), with blades 1 meter to 3 meters in diameter. Today, wind turbines are being installed in the windiest locations of the state. These large wind turbines have long, thin blades that are 30-70 meters in diameter. Each wind turbine can produce 300 kW to more than a megawatt (MW) of power. And they are mounted on top of towers 40-80 meters tall.



TEXAS WIND POTENTIAL
Windy areas in Texas are indicated on the map as shaded areas (darker color represents stronger wind speeds).

TEXAS-SIZE POTENTIAL

Texas has a large wind energy potential. The main regions where wind resources are the greatest are in west Texas, the High Plains and along the Gulf coast from Mexico to Matagorda. Studies have shown that the annual wind power available is approximately 250,000 MW. This amount of energy potential is around four times the amount of electricity that is being created in Texas right now. Lands that are considered good sites are areas where the ground can hold a wind turbine and where the average wind speed is at least 12 miles per hour measured at a height of 33 feet.

Utilities and groups that develop wind farms look for the windiest places in Texas. The best locations — on top of mountains and mesas in West Texas and along ridges in the Panhandle — are being developed first.

WIND-DRIVEN MEGAWATTS

As of the end of 2003, the United States had 6,374 MW of wind power in use. Much of the recent growth in the U.S. wind power industry has occurred in Texas. Electric utilities are using wind power because of its cost-effectiveness. By being cost-effective, wind power is attractive to both the homeowner and the electric companies that want to lower the cost of producing electricity. Wind turbines are modular. They can be installed rapidly and will produce electricity that is less expensive than electricity produced in new coal-fired plants. Even so, it costs between $1 million to $2 million per megawatt to build a wind farm.

WIND PROJECTS IN TEXAS

As of September 2007, Texas had more than 3,500 MW of wind capacity. Projects are located in or near the Delaware Mountains, Fort Davis, McCamey, King Mountain, Big Spring, Trent, Sweetwater, Abilene and the Texas Panhandle.

The first large-scale wind farm was installed in the Delaware Mountains in Culberson County in 1995; it has 112 turbines. The first phase of the project, consisting of 35 MW, was developed on land leased from the State's

Permanent School Fund. The project pays about $100,000 per year to the fund, which is used to help educate the youth of Texas.

FARMING & RANCHING WITH THE WIND

Large utilities are getting the most attention for using wind power. But Texas' agricultural producers and rural homeowners have been using wind power for decades. Windmills, such as the 1930's Aeromotor, continue pumping water for cattle and crops. But many are at the end of their lives. Some are being replaced with solar photovoltaic (PV) units in sunny areas. New water pumping systems, which combine wind and PV, are now available as well. In rural areas, Texans are also installing small-scale wind power systems (from 300 W to 5 kW) for their electric needs where there are no power lines nearby.

SOURCE: ALTERNATIVE ENERGY INSTITUTE

TEXAS WIND POWER *Brazos Wind Ranch, Scurry County has 160 wind turbines, this wind farm's turbines are 1 MW each.*

SOURCE: ALTERNATIVE ENERGY INSTITUTE

LARGE MODERN WIND TURBINES *In the foreground is the 1.65 MW wind turbine at Big Spring; in the background are 660 kW units.*

A WINDY FUTURE

New wind farms are being developed today throughout Texas. A state law that was signed in 1999 made it possible for these new wind farms to be developed. The law set a goal to install 2,000 MW of new renewable energy resources by 2009. In 2005, Texas legislators revisited this goal and increased it to 5,000 MW by 2015 and to 10,000 MW by 2025. Because of the cost-effectiveness of wind turbines, it is expected that most of this 5,000 MW will be from wind farms. These new wind farms will be a major factor for developing rural areas in Texas.

ORGANIZATIONS

American Wind Energy Association
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www.awea.org

Alternative Energy Institute
Box 60215, WTAMU
Canyon, TX 79016
(806) 651-2295
www.wtamu.edu/research/aei or
www.windenergy.org

CADDET
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1617 Cole Blvd.
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www.caddet.org

National Renewable Energy Laboratory
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Texas Solar Energy Society
P.O. Box 1447
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Texas Renewable Energy Industries Association
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www.treia.org

RESOURCES

FREE TEXAS RENEWABLE ENERGY INFORMATION
For more information on how you can put Texas' abundant renewable energy resources to Use in your home or business, visit our website at **www.InfinitePower.org** or call us at 1-800-531-5441 ext 31796. Ask about our free Teacher Resource Guides and CD available to teachers and home schoolers.

ON THE WORLD WIDE WEB:
U.S. Department of Agriculture. Wind and solar water pumping, wind/diesel, and units for blade tests. Located 12 miles west of Amarillo, Texas; site is available for tours.
www.cprl.ars.usda.gov

Texas Wind Farms
www.awea.org/projects/texas.html

Trent Mesa Wind Farm: **www.trentmesa.com**

Lower Colorado River Authority: **www.lcra.org/energy/renewable_energy.html**

Indian Mesa I: **www.wind.enron.com/**

Wind Farm Developers: **www.awea.org/** – go to: about awea – member directory

Farm Windmill, American Wind Power Center: **www.windmill.com**

BOOKS:
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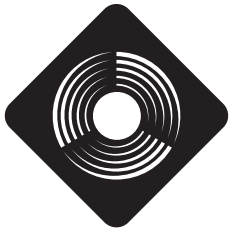
Introduction to Wind Energy. Vaughn, Earl Gilmore and Kenneth Starcher, AEI Report 94-2. (Available from the Alternative Energy Institute)

Wind Characteristics, An Analysis for the Generation of Wind Power. Janardan Rohatgi and Vaughn Nelson, 1994. (Available from the Alternative Energy Institute)

Wind Energy Basics, a Guide to Small and Micro Wind Systems. Paul Gipe, Chelsea Green Publishing, 1999.



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